1. Title:	Achieving Diffraction-limited EUV Aerial Image Microscopy
2. Full names of all authors:	1. I. Mochi, 2. K. A. Goldberg, 3. P. Naulleau, 4. S. Huh
3. For all authors: Company affiliation, e-mail, phone number, fax number, mailing address	(1) Lawrence Berkeley National Laboratory IMochi@lbl.gov Phone: 1-510-486-4394 Fax: 510-486-4550 Center for X-Ray Optics, Lawrence Berkeley National Laboratory, Berkeley, CA 94720 (2) Lawrence Berkeley National Laboratory KAGoldberg@lbl.gov Phone: 1-510-495-2261 Fax: 510-486-4550 Center for X-Ray Optics, Lawrence Berkeley National Laboratory, Berkeley, CA 94720 (3) Lawrence Berkeley National Laboratory PNaulleau@lbl.gov Phone: 1-510-486-4529 Fax: 510-486-4550 Center for X-Ray Optics, Lawrence Berkeley National Laboratory, Berkeley, CA 94720 (4) SEMATECH Sungmin.Huh@SEMATECH.org Phone: 518.956.7439, Fax: 518.956.7151 255 Fuller Road, Suite 309 Albany, NY 12203
4. Presenting author:	Iacopo Mochi
5. EUVL topic (check only one by "X")	☐ Exposure Tools (ET) ☐ Optics & ML Coatings (ML) ☐ Sources (SO) ☐ Optics Contamination (OC) ☐ Resists (RE) ☐ Device Integration (DE) ☒ Masks (MA) ☐ Technology Readiness (TR) ☐ Defect Inspection (DI) ☐ Cost of Ownership (CO) ☐ Reticle Contamination (RC)
6. Presentation preference:	☒ oral ☐ poster

7. Abstract body:

The SEMATECH Berkeley Actinic Inspection Tool (AIT) is a prototype EUV aerial image microscope dedicated to EUVL mask inspection. The AIT uses a conceptually simple optical system to focus mask-reflected light on a CCD detector with high magnification.

The AIT has a flexible design and light path that enables the use of zoneplates with different optical properties. However, the drawback of such flexibility is the need for frequent, careful, fine alignment to maintain optimal performance and minimize alignment-dependent aberrations. In order to improve the alignment procedures, and thus the performance and stability of the tool, we have developed a detailed ray-tracing model of the optical system, and image analysis tools that provide quantitative aberration feedback. Feedback enables us to correct misalignments with greater confidence, and to reach closer to the goal of diffraction-limited performance.

Advances in system alignment, and recent upgrades that include new zoneplates and a higher resolution CCD camera enable the AIT to achieve contrast values above 75% at 100-nm (mask) linewidth. New user-selectable zoneplates have higher magnification ratios than before, and 4x NA values from 0.25 to 0.35. We will describe our improved alignment strategy and the results of performance testing.

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